Encoding the ATP III Guideline: Modeling Declarative Drug Information

Samson Tu MS
Susana Martins MD MSc
Martha Michel PhD

Session objectives:

- Understand how to model drug information
- Understand how to make drug recommendations

Output from previous session: Consensus on guideline content

I. Drug Therapy

Drug Class	Agents	Contraindications
Statins	-Lovastatin -Simvastatin -Pravastatin -Atorvastatin	**Absolute:** Active or chronic liver disease **Relative:** Concomitant use of erythromycin, cyclosporine.
Bile acid sequestrants	-Cholestyramine -Colestipol -Colesevelam	**Absolute:** dysbeta-lipoproteinemia TG>400 mg/dl **Relative:** TG>200 mg/dl
Nicotinic acid	-Immediate release nicotinic acid -Extended release Nicotinic acid - Sustained release Nicotinic Acid	**Absolute:** Chronic liver disease Severe gout **Relative:** Diabetes, Hyperuricemia Peptic ulcer
Fibric acid	-Gemfibrozil -Fenofibrate -Clofibrate	**Absolute:** Severe renal disease Sever hepatic disease

VA formulary:

VA formulary Preferred	Drug	Dose range
1st choice	`lovastatin`	`20-40mg`
2nd choice	`simvastatin`	`40-80mg`

Output from previous session: Conceptualization I, II

Statin

I. Compelling indication: LDL not within goal range
II. Absolute contraindication
    - Chronic liver disease
    - Active liver disease as defined by ALT>40 or AST>40
III. Relative contraindication: Concomitant use of erythromycin, cyclosporine

Output from previous session: Encoding I, II

An ATP3 knowledge base with

IV. Concept hierarchy
V. Eligibility criteria, goals, and risk groups
VI. Clinical algorithm

II. Workshop Activity 1: Define Statin's indications and contraindications

Step 1:

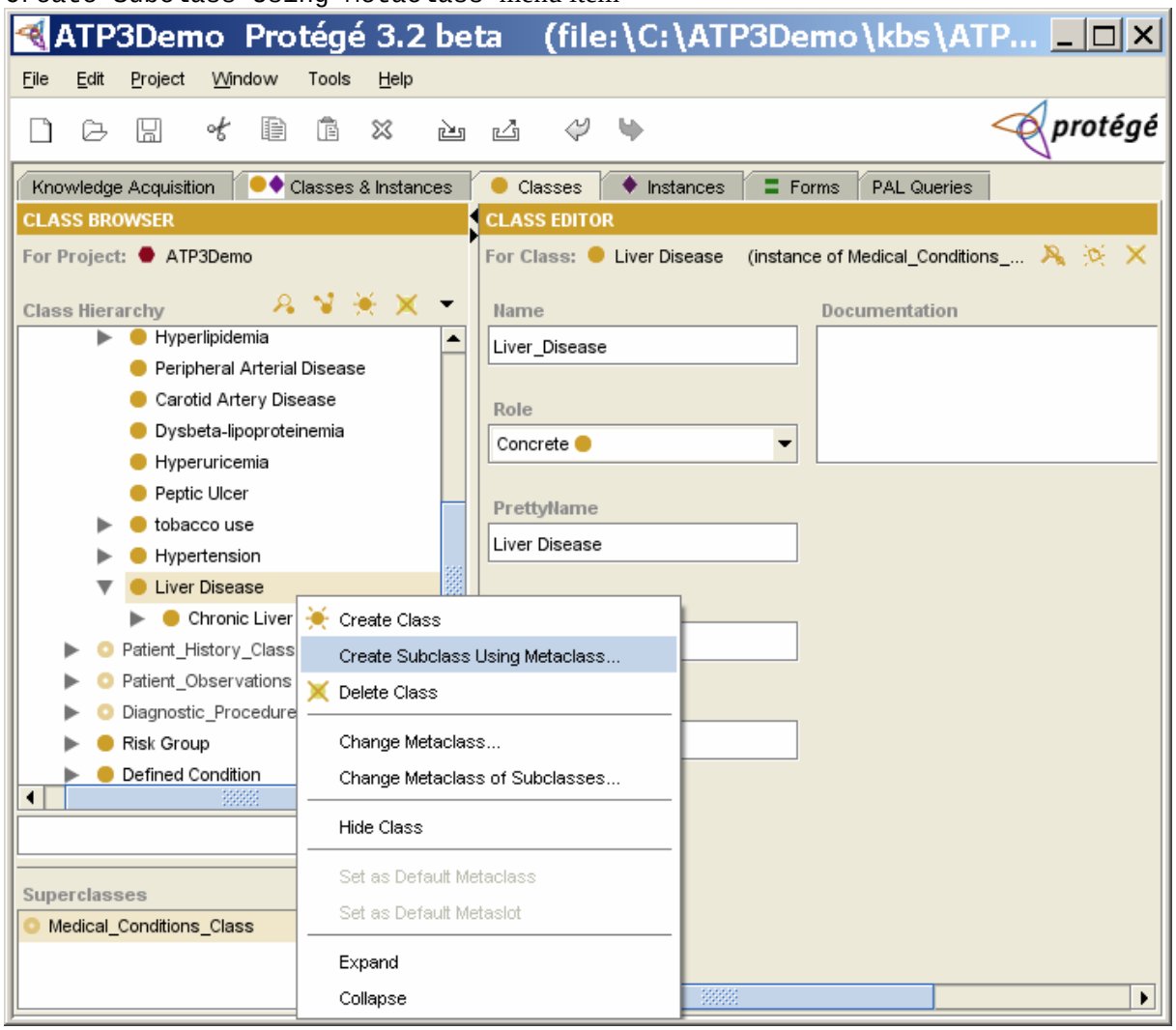
The EON model constrains the indications and contraindications to be subclasses in the *Diagnostic Class* hierarchy. Thus, the concepts that we want to enter as indications and contraindications of Statin have to be classes in the hierarchy.

Situation 1. The indication and contraindication concepts are defined by ICD9 codes in *Diagnostic Class* hierarchy (e.g., *chronic liver disease*). They can be used directly.

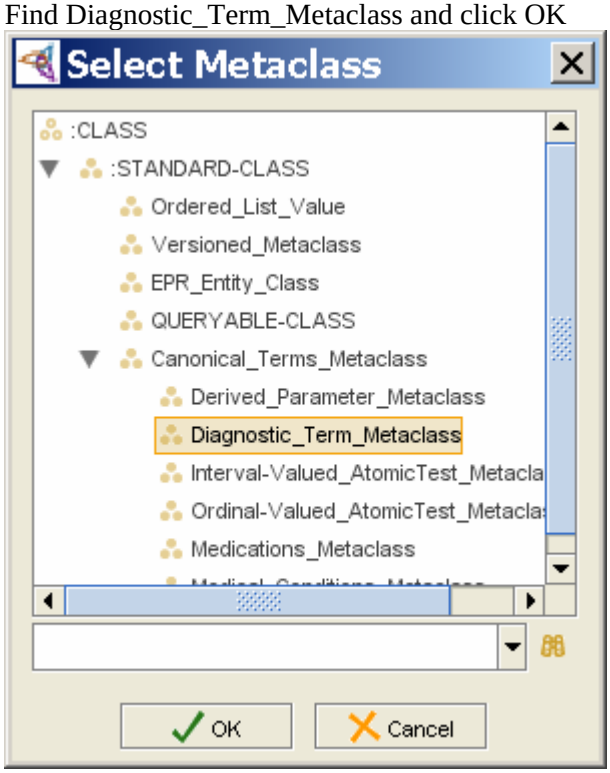
Situation 2. The indication and contraindication concepts have to be defined using definitional criteria.

Directions:

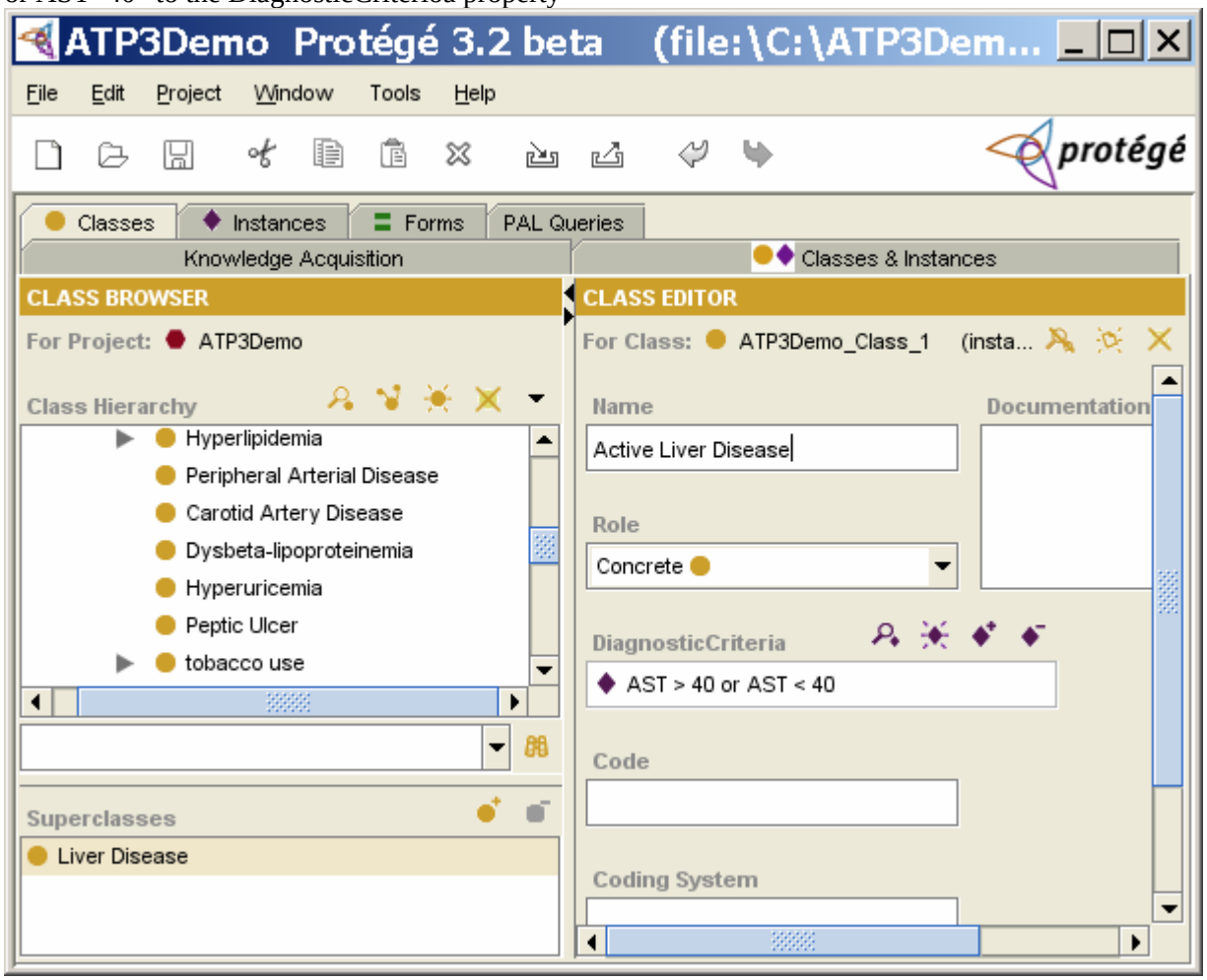
1) In Protégé's "Classes & Instances" tab, create a *Active Liver Disease* subclass of *Liver Disease* using the *Diagnostic_Term_Metaclass* (Right click on *Liver Disease* class and select `Create Subclass Using Metaclass` menu item



2) Find Diagnostic_Term_Metaclass and click OK



3) Change the Name of the class to Active Liver Disease, and add the N_ary_Criterion "AST>40 or AST<40" to the DiagnosticCriterioa property



4) In Protégé's "Classes & Instances" tab, find the *Defined Class* subclass of *Diagnostic Class* using the *Diagnostic_Term_Metaclass*

5) Create the following as subclasses of *Defined Class*, following same steps as before

- LDL is outside guideline goal target
- (Bonus) Presence of erythromycin medication

Step 2: Add concepts defined in Step 1 as compelling indications and absolute and relative contraindications of "drug usage" classes

Directions:

1) In Protégé's "Knowledge Acquisition" tab, create an instance of *Drug Usage*
2) Link this instance to the statin drug class in the *Medical Domain Class* hierarchy through the *Drug Class Name* attribute
3) Add concepts defined in Step I to the appropriate properties

Step 3: Add Bile acid sequestrants and Nicotinic acid as "drug usage" instances

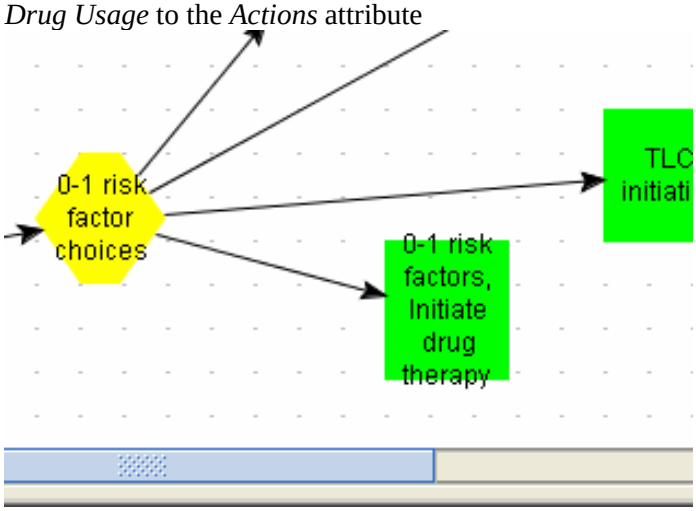
Directions:

1) Similar to 1) and 2) of Step 2

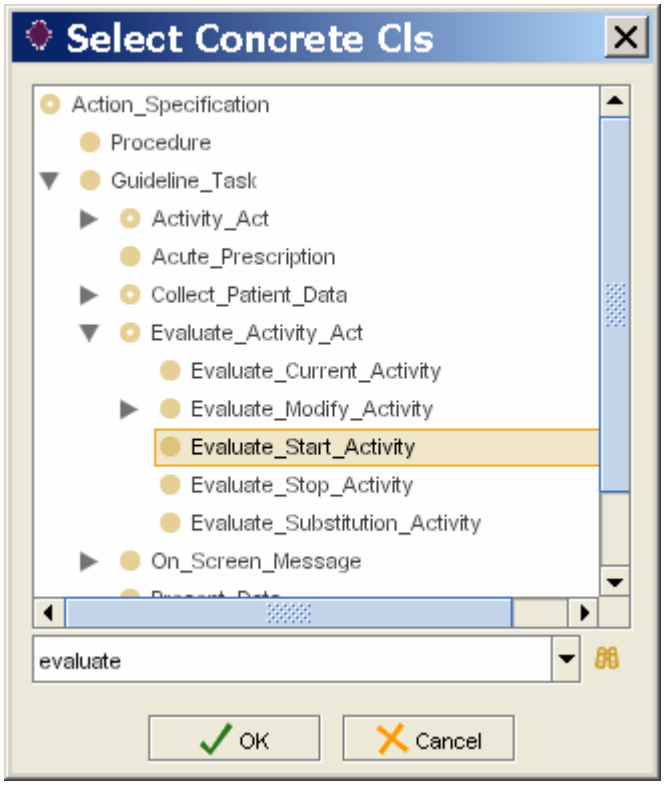
III. Workshop activity 2: Add add-drug recommendation to "initiate drug therapy" action choice

Directions:

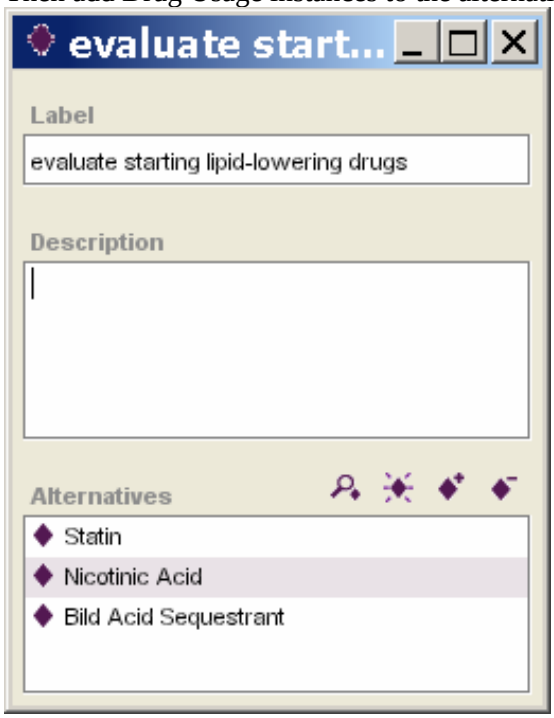
Step 1: Open the management diagram, find action choices (green rectangles) that recommend initiate drug therapy for low-risk (0-1 risk factors), add *Evaluate Start Activity* instance with Statin and Niacin *Drug Usage* to the *Actions* attribute



Use Add instance button to create an instance of Evaluate Start Activity



Then add Drug Usage instances to the alternatives



Step 3 Test the System

1) Go to EON/ATHENA Guideline Test Environment tab
2) Test with low-risk patient who has LDL of 200 mg/dL

IV. Workshop activity III: Adding Guideline Drugs

V. Workshop Activity IV: Test increasing dose

1) Go to EON/ATHENA Guideline Test Environment tab

2) Test with low-risk patient who has

- **Lovastatin medication at 20 mg/day**
- **LDL of 200 mg/dL**

3) Test with low-risk patient who has

- **Lovastatin medication at 20 mg/day**
- **LDL of 200 mg/dL**